



The 2040 Investment Plan for the MBTA

STATE OF THE SYSTEM REPORT: BUS



December 2015

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ABOUT THE STATE OF THE SYSTEM REPORTS

These State of the System reports lay the foundation for the development of *Focus40*, a financially responsible 25-year capital plan for the MBTA, to be released in 2016. Planning for the future requires a clear understanding of the present. These reports describe that present: the condition, use, and performance of the MBTA bus, rapid transit, commuter rail, ferry, and paratransit systems. In addition, these reports describe how asset condition and age influence service performance and customer experience.

The next phase of *Focus40* will consider how a range of factors – including technological innovation, demographic shifts, and climate change – will require the MBTA to operate differently in 2040 than it does today. With the benefit of the information provided in these State of the Systems reports, the *Focus40* team will work with the general public and transportation stakeholders to develop and evaluate various strategies for investing in and improving the MBTA system in order to prepare it for the future.

SUMMARY OF STATE OF THE SYSTEM: BUS

More than a third of all MBTA trips are taken on buses. But an aging bus fleet, insufficient maintenance facilities, congested roads, and other problems – some of them beyond the MBTA's control – means that these 446,700 daily riders, many of them of lower income and dependent upon bus service, frequently do not receive the service that they deserve or that would meet the MBTA's own standards.

BUS OVERVIEW

MBTA bus service complements the subway system to form the fixed route transit network in Greater Boston's urban core.

The MBTA operates a range of bus services, primarily within Route 128. These include feeder buses that serve major subway stations; express buses that connect suburban locations with the downtown core; bus-rapid transit routes in the South End and Seaport areas of Boston; and routes that connect residential parts of the urban area. While some routes have low ridership, most are heavily used and are challenged daily by crowding, unreliability, and problems sticking to the published schedules.

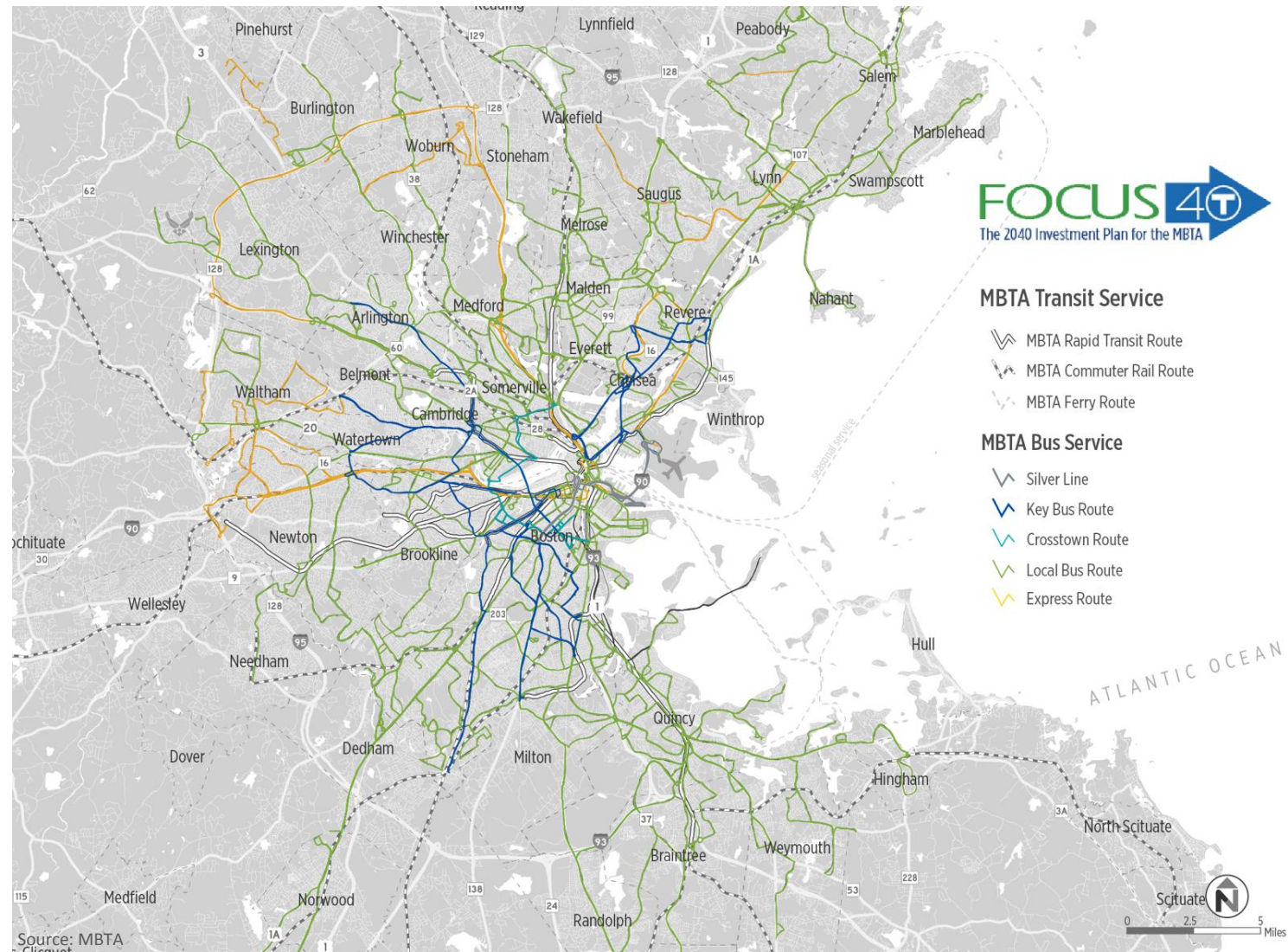
Most MBTA bus routes operate in mixed traffic; in other words, lanes are not dedicated to bus-only travel. This forces buses to compete for space with trucks, bicycles, double-parked vehicles, and private cars, causing frustrating delays and uncertainties for passengers. Buses also have the fewest amenities at stops and are frequently used by passengers with no transportation alternatives. All of these factors conspire to create an impression among the traveling public that buses are generally perceived to be the least favorable MBTA mode.

While the bus mode collects the lowest share of fare revenue of the three major MBTA modes, it also requires the lowest level of capital investment. Due to these lower capital costs, the bus system has more flexibility to adapt to shifts in demand than commuter rail or rail rapid transit service.

MBTA Annual Metrics by Mode - 2013				
	Operating Expenses (%)	Fare Revenues (%)	Passenger Miles (%)	Passenger Trips (%)
Bus	29.8	17.8	15.4	29.8
Commuter Rail	26.4	29.9	40.4	8.9
Rapid Transit	35.1	49.9	42.8	60.4
Ferry	0.8	1.1	0.6	0.3
Paratransit	7.9	1.3	0.8	0.5

SERVICE MAP

Most bus service operates within Route 128



The MBTA operates 170 routes that provide four different types of service:

- **Silver Line** Five routes that include elements of bus rapid transit (BRT): articulated buses, enhanced stations, off-board fare collection, transit signal priority, and some dedicated bus lanes, including the South Boston Silver Line tunnel.¹
- **Key Bus Routes** Fifteen routes that serve high levels of passenger demand in high-density travel corridors. Key Bus Routes are similar to local bus routes, but may also have greater stop spacing, enhanced stops, and higher frequencies.
- **Express** 23 express routes that provide peak period service oriented toward commuters. Express routes operate via major highways with very few intermediate stops.
- **Local** 127 local routes that provide service along both the local and regional street network.²

¹These are all common features of Silver Line service; however, not all services and stations have all features, making the Silver Line not a true BRT service.

²Private contractors operate five of these routes (710, 712, 713, 714, and 716).

RIDERSHIP

Ridership on the the MBTA bus system alone is higher than the total ridership of all but seven American public transit systems.

In 2014, the MBTA bus system carried:

446,700 riders per weekday

235,600 per Saturday

149,200 per Sunday

15 Key Bus Routes account for one-third of all bus ridership.

	Weekday Routes	Weekday Ridership	Saturday Routes	Saturday Ridership	Sunday Routes	Sunday Ridership
Silver Line	5	34,200	5	20,700	5	15,200
Key Bus Routes	15	147,700	15	95,600	15	62,300
Express	23	16,100	4	2,600	2	1,600
Local	127	248,600	107	118,200	76	70,000
Total	170	446,700	131	237,100	98	149,200

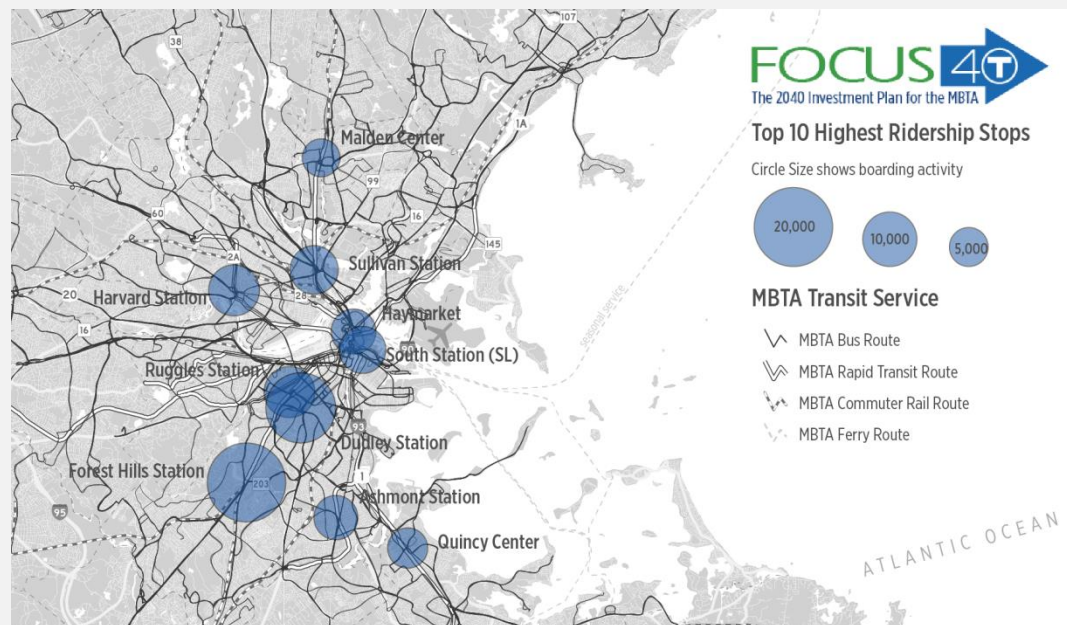
Source: MBTA; Note: Ridership figures rounded to nearest 100

SYNERGY BETWEEN BUS AND RAPID TRANSIT

Some of the most heavily used bus facilities are located at rapid transit stations, allowing easy transfers for customers.

Rapid transit stations with highest bus ridership

Station	Weekday Boardings
Forest Hills	20,553
Ruggles	8,624
Harvard	8,585
Sullivan	7,753
South Station (Silver Line)	7,299
Haymarket	6,838
Ashmont	6,670
Quincy Center	5,481
Malden Center	4,833



Source: 2015 MBTA ridership by stop data

Note: Dudley Station, which is a bus-only facility, is the MBTA's second highest bus ridership station, with 16,200 boardings per weekday.


RIDERSHIP DEMOGRAPHICS

Buses serve significantly more minority riders and more low-income riders than other modes.

	Minority	Low-income
BUS	46.5%	41.5%
Rapid Transit	27.5%	24.1%
Commuter Rail	13.9%	7.2%
Ferry	5.7%	4.5%
Total	33.0%	28.5%

Source: 2008-2009 MBTA Systemwide Passenger Survey (the MBTA is currently updating its systemwide survey)

BUS FARES

 <p>Get a CharlieCard and Save! Then upgrade your CharlieCard with MyCharlie</p>	
CharlieCard	\$1.60 \$3.65 Inner Express \$5.25 Outer Express FREE transfer to Local Bus and DISCOUNTED transfer to Subway or Express Bus FREE Transfer from Express Bus to Subway One Transfer valid within two hours of paying your fare.
CharlieTicket/ Cash-on-board	\$2.10 \$4.75 Inner Express \$6.80 Outer Express FREE transfer to Local Bus with CharlieTicket—does not apply to cash-on-board rides.
Monthly Local Bus Pass	\$50/month Valid on Local Bus.
Monthly Inner Express Pass	\$115/month Valid on Inner Express Bus PLUS Subway, Local Bus, Inner Harbor Ferry, and Commuter Rail Zone 1A .
Monthly Outer Express Pass	\$168/month Valid on Outer Express Bus PLUS Inner Express Bus, Local Bus, Subway, Inner Harbor Ferry, and Commuter Rail Zone 1A .
Monthly LinkPass	\$75/month Valid on Subway PLUS Local Bus.
Day / Week LinkPass	\$12.00 for 1 day \$19.00 for 7 days Valid on Subway, Local Bus, Inner Harbor Ferry, and Commuter Rail Zone 1A .
Seniors and Persons with Disabilities (Blind persons ride for free)	\$.80/ride \$29/month for 7-day validity \$2.35 Inner Express \$3.40 Outer Express Valid on Local Bus and Subway. Requires a Senior/TAP ID or Mass Commission for the Blind ID. No discounts apply to Express Bus Passes.
Students (Junior High and High School)	\$.80/ride \$26/month for 7-day validity \$26/month for 5-day (Monday-Friday) only \$2.35 Inner Express \$3.40 Outer Express Valid on Bus, Subway, Express Bus, and Commuter Rail Zones 1, 1A, and 2 . Requires Student ID Badge.
Children 11 years old and under	Free Children under the age of twelve ride free when accompanied by an adult, with a limit of two children for each adult.

Passengers can purchase passes, CharlieTickets, and CharlieCards at:

- Ticket Vending Machines at rapid transit stations (and some commuter rail and bus facilities)
- Retail sales terminals located in neighborhood retail establishments
- [mbta.com](#)
- The CharlieCard Store at Downtown Crossing Station

Unlike on most other MBTA services, bus fares are paid as customers are boarding the vehicle—a process that can lead to longer periods stopped at a bus stop, while contributing to longer trips overall.

BUS ASSETS

Nearly 1,000 buses and a range of other infrastructure keep the bus system running.

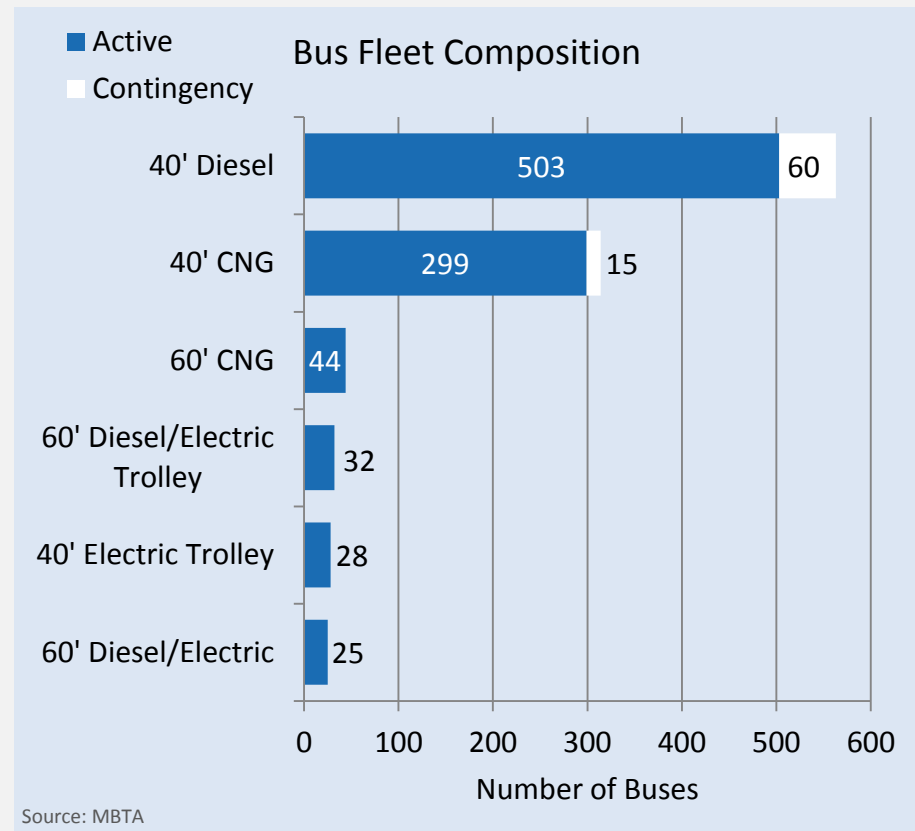
BUS FLEET

The MBTA provides bus service using a fleet of 991 active* buses.

Six different vehicle types, mostly 40-foot diesel or compressed natural gas (CNG).

Some special vehicles for specific services:

- 60' articulated diesel/electric trolley for Silver Line tunnel
- 60' articulated diesel hybrid and CNG for high ridership routes
- 40' electric trolley buses in Cambridge, Watertown, and Belmont



**The MBTA has a total of 75 additional inactive/contingency vehicles that are used for diversion shuttles and on an emergency basis.*

BUS INFRASTRUCTURE

While not as infrastructure-intensive as rail, a significant amount of infrastructure is still associated with bus service:

Bus facilities at most rapid transit stations

8,500 bus stops

- 675 shelters (116 owned by the MBTA)

Three major bus-only stations:

- Dudley Station (bus hub)
- Courthouse Station (Silver Line Station)
- World Trade Center Station (Silver Line Station)

Two underground facilities at rapid transit stations:

- South Station
- Harvard

Four sections of dedicated right-of-way:

- Two tunnels: Harvard Station and South Boston Silver Line
- Two lanes: Washington St. and Essex St.

Two overhead electric catenary systems: one in the Silver Line tunnel and one in Cambridge, Watertown, and Belmont.



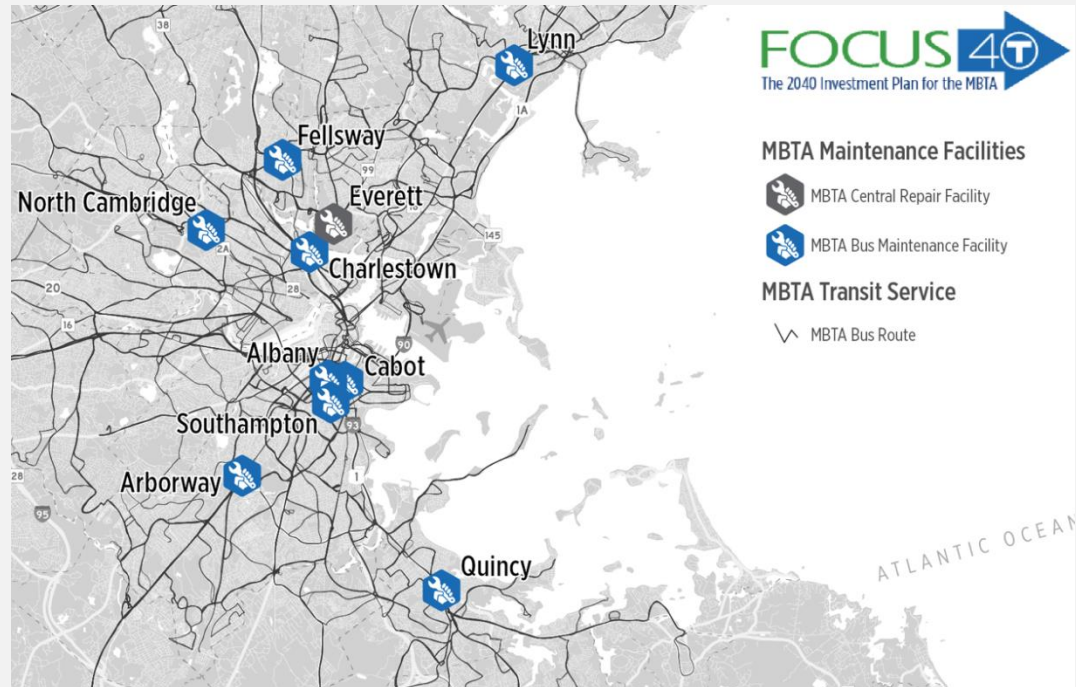
Note: Additional right of way and dedicated bus stations are currently under construction in Chelsea as part of the Silver Line Gateway project

BUS MAINTENANCE FACILITIES

Buses are stored and maintained at nine locations, each of which provides space for:

- Bus operators and related bus operations functions
- Bus maintenance
- Bus storage

The MBTA also operates the Central Repair Facility in Everett, for heavy maintenance for the entire bus fleet and rapid transit vehicle overhauls.



BUS SERVICE PERFORMANCE

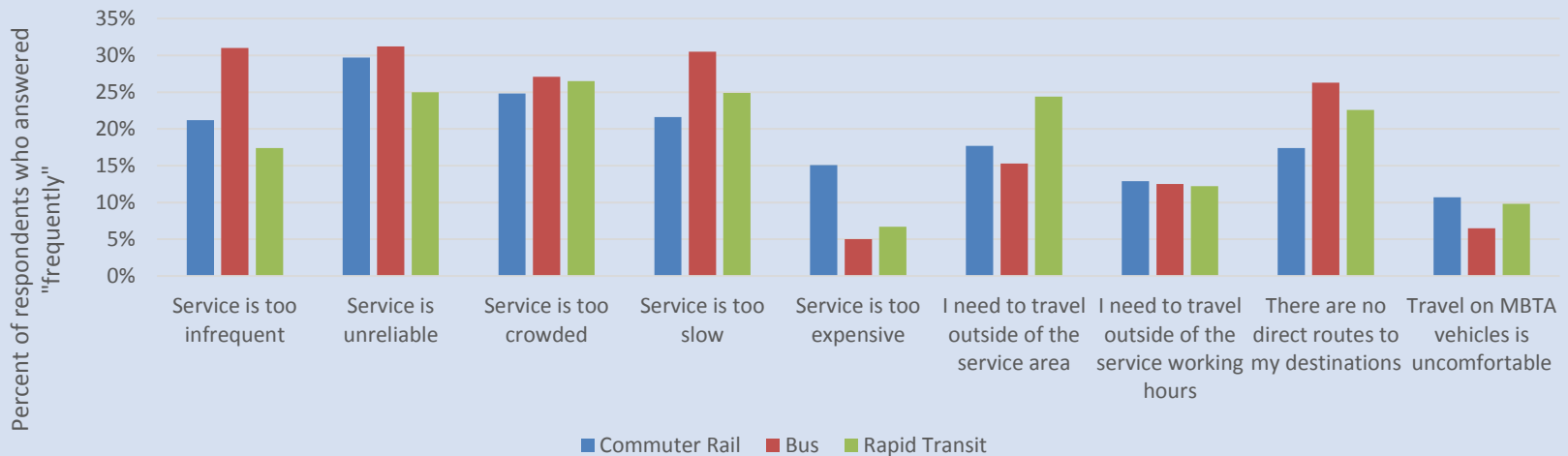
The MBTA's own service standards are often not met.

CUSTOMER VOICE

The MBTA surveyed 6,000 customers across all modes in the summer of 2015.

Of all respondents, bus riders were the most dissatisfied, identifying service infrequency, unreliability, and slow speeds as discouraging use of the bus system.

Factors that "frequently" prevent people from using the MBTA



These service characteristics are affected by a combination of:

- Asset Condition: The condition of the MBTA bus fleet
- Asset Quantity: The inadequate size of the MBTA bus fleet
- Internal Operations: Labor practices and budget constraints
- External factors: Real-world conditions that are beyond the control of the MBTA

MBTA SERVICE GUIDELINES

The MBTA's Service Delivery Policy* articulates the type of service it should provide in terms of:

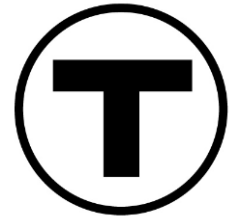
- Service coverage
- Minimum spans of service
- Cost-effectiveness
- Minimum service frequencies
- On-time performance
- Maximum crowding levels

Meeting existing service coverage, minimum span of service, and cost-effectiveness standards are generally not an issue.

However, standards for service frequencies, on-time performance and crowding are often not met, leaving many customers unsatisfied with MBTA bus service.

**The MBTA is currently in the process of updating its service standards.*

Service Delivery Policy



MBTA Board of Directors approved
June 2, 2010

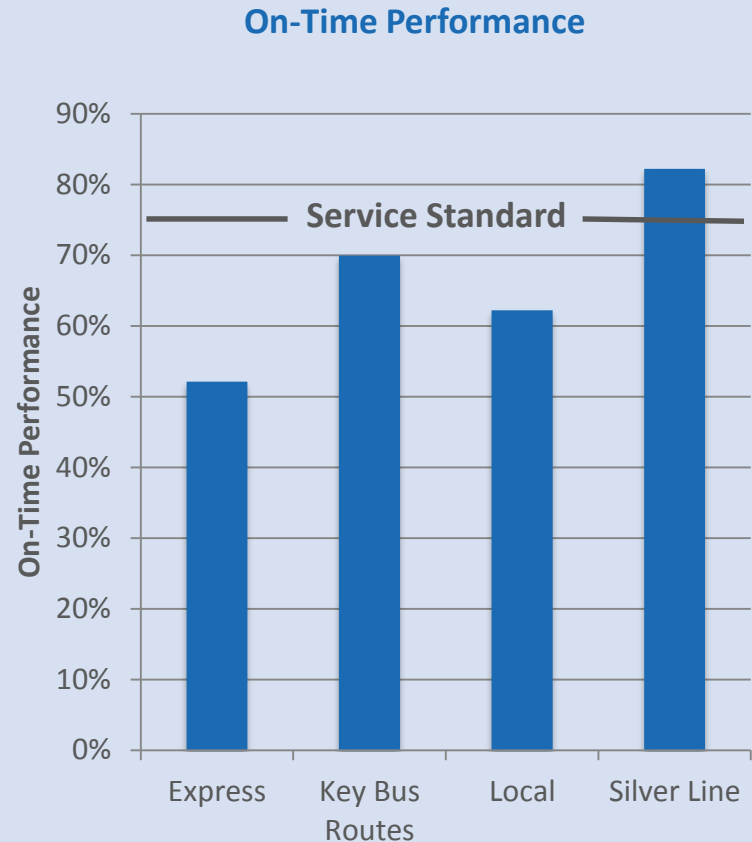
 **Massachusetts Bay Transportation Authority**

ON-TIME PERFORMANCE (OTP)

OTP is poor, with nearly all bus service performing below the 75% on-time standard.

Silver Line and Key Bus routes perform best due to emphasis on addressing operating environment constraints:

- **Bus lanes/dedicated rights-of-way:**
Limit delays due to traffic.
- **Bus stop improvements:**
Reduce obstructions to easy boarding.
- **Stop consolidation:**
Reduces the number of stops to speed up trips.
- **Transit Signal Priority (TSP):**
Provides buses with a better chance of making green lights.
- **Some off-board fare collection:**
Speeds the boarding process.



Source: MBTA Performance Indicators, 2012

On-time performance standards are: Frequent Service (every 10 minutes or less): depart within 1.5 times scheduled headway, leave mid-route timepoints within 1.5 times scheduled headway, and arrive within 20% of scheduled running time; Other routes: depart 0 to 7 minutes late, leave mid-route timepoints 0 to 7 minutes late, and arrive 3 minutes early to 5 minutes late.

SERVICE FREQUENCY/CROWDING

Frequency standards dictate desired frequency of scheduled trips.* During rush hour and other peak periods, the MBTA uses all of its available buses to try to meet its published schedule. **However, the MBTA does not have enough buses to meet frequency standards on all routes**, resulting in crowding and public dissatisfaction.

MBTA Bus Service Not Meeting Current Frequency Standards:

Weekdays:

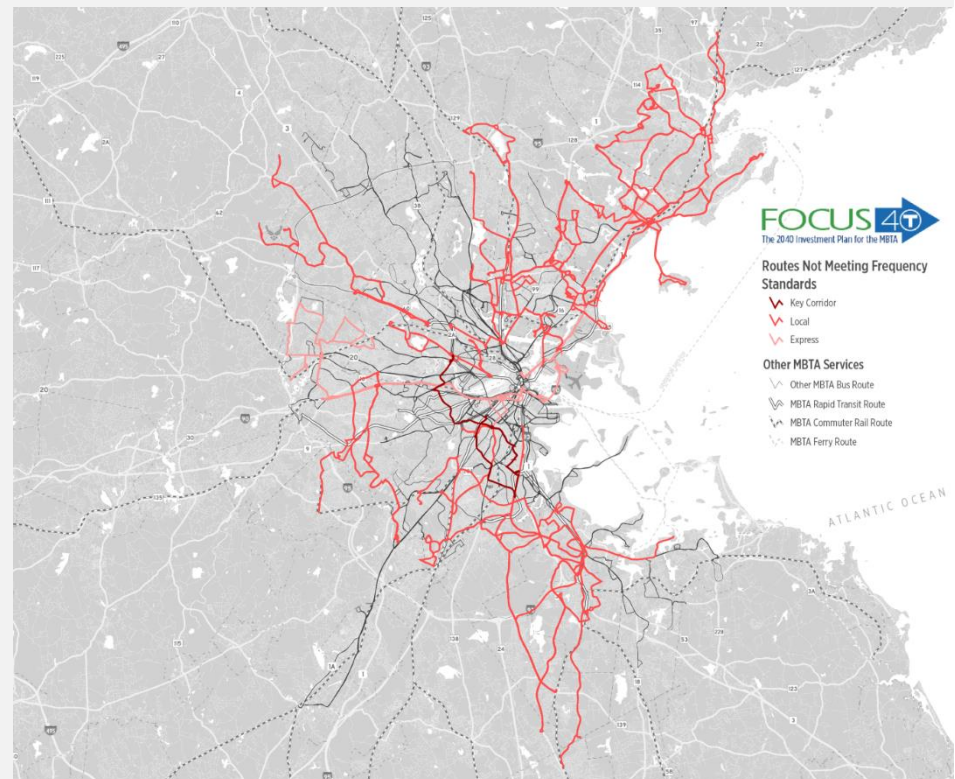
- 20% of Key Bus routes
- 41% of local routes
- 30% of express

Saturdays:

- 7% of Key Bus routes
- 23% of local routes

Sundays:

- 13% of Key Bus routes
- 33% of local routes



Source: MBTA 2012 data, weekdays

*Minimum service frequency standards are: Key Bus routes: 10 minutes Peak, 15 minutes Early AM and Midday Base/School, and 20 minutes evenings and weekdays; Local: 30 minutes Peak and 60 minutes off-peak and weekends; Express: 3 trips per peak direct in the AM and PM Peaks.

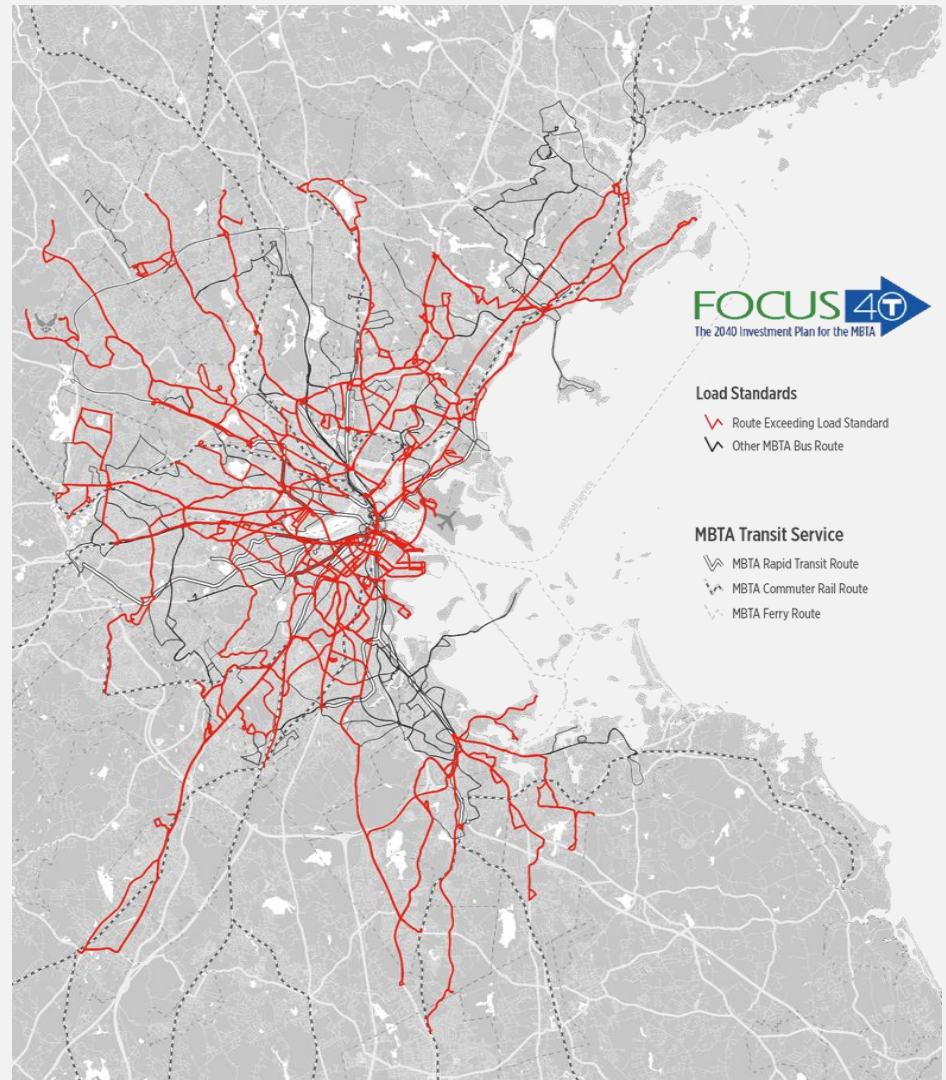
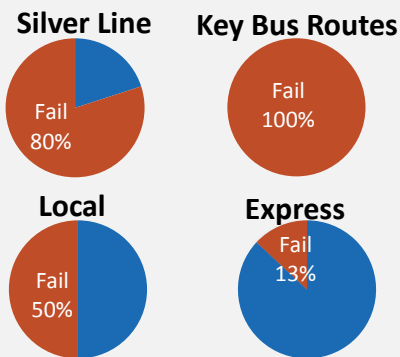
SERVICE FREQUENCY/CROWDING

Most routes fail MBTA standards* for crowding:

- Nearly all Silver Line routes
- All Key Bus routes
- Half of the local bus routes

Crowding is caused by:

- Scheduled frequency that does not match demand
- Delayed trips
- Missed trips



Source: MBTA Performance Indicators, 2012

**Based on the MBTA's Service Delivery Policy for a route to pass loading standards on weekdays loads cannot exceed the standard when averaged over any 30-minute segment of an Early AM, AM Peak, Midday School or PM Peak period, or any 60-minute segment of a Midday Base, Evening, Late Evening or Night/Sunrise period. On weekends, loads cannot exceed the standard when averaged over any 60-minute segment of the whole service day.*

BUS SERVICE SUMMARY

The service standards that most impact user satisfaction are generally not being met:

- **Service Frequency:** Many local routes operate less frequently than MBTA standards dictate.
- **On-Time Performance:** With the exception of a handful of routes, on-time performance is below 70% across the bus system.
- **Crowding:** Many routes are overcrowded, particularly on Silver Line and Key Bus routes, which already run at high frequencies.

These issues are the result of **operating issues and budget factors; facility and fleet constraints; and external challenges, such as on-street congestion.**



BUS ASSET PERFORMANCE

An aging fleet and inadequate maintenance facilities affect service.

ASSET PERFORMANCE

State of Good Repair (SGR):

The MBTA maintains a current inventory of capital assets in its State of Good Repair (SGR) Database.

The Database generates scores for each asset, based on **age, condition and performance**. 1 = low, 5 = high, >2.5 = SGR.

When referencing SGR scores, it is important to note:

- **Summary scores at the asset/modal level represent the average of all assets in the category**, and are a less precise tool for understanding condition of the individual assets within the category.
- Since SGR scores are blended evaluations of age and condition/performance, **relatively new assets that perform poorly may have better SGR scores than their condition alone would suggest**.
- **Assets that are within their useful life and performing as intended will have good SGR scores, even if the assets are inadequate to meet current or future needs of the system.**
- **The SGR backlog will continue to change** – as assets age and are replaced, the backlog decreases; conversely as assets age and do not get replaced, the backlog increases.

The MBTA has conducted extensive work to define the condition of its major capital assets through the SGR database, and will continue to update the SGR database each year. The next organizational step is to begin collecting data for the Maintenance Management System (MMS), a more granular asset management tool that will help the MBTA to implement lifecycle management processes and track asset condition down to the smallest replaceable component. The MBTA also needs to regularly update its existing asset management plan – a policy/strategy document for implementing asset management across the MBTA – for all asset classes. A continuous, predictable capital funding program, including funding for these tasks, is essential to maintaining an effective asset management program.

STATE OF GOOD REPAIR BACKLOG

Bus assets have a maintenance backlog of **\$609 million** and a replacement value of **\$1.5 billion**.

Asset Category	Average SGR Rating (0 to 5 Scale)	Backlog (\$millions)	Compared to Other MBTA Modes
Revenue vehicles	2.83	\$466.6	Similar
Non-revenue Vehicles	1.46	>\$0.1	Worst
Communications	4.21	\$0.2	Best
Fare Equipment	3.75	\$0.3	Slightly worse
Stations	3.14	\$7.7	Similar
Elevators /Escalators	3.12	>\$0.1	Similar
Parking	1.92	>\$0.1	Worst
Facilities	3.42	\$134.3	Best
Technology	1.30	>\$0.1	Worse
Total		\$609.3	

Source: Draft SGR report 8/10/15; Green = Excellent to Good; Yellow = Fair to Marginal; Red = Substandard to Poor

BUS FLEET

MBTA BUSES ARE COMPARATIVELY OLD.

991 active buses:

- Typical lifespan = 12 years; most MBTA buses 7-12 years old

Older buses require more maintenance, break down more often, and are disproportionately responsible for service disruptions.

An upcoming purchase of 369 new MBTA buses will bring the average age below 6 years.

Still, most MBTA buses will need to be replaced within the next six years.

Also, procuring a large percentage of the fleet at one time is not optimal, because it creates lifecycle maintenance challenges.

	Bus Age (Years)																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Active Buses	60				25	523	124	155	8	24	72						
Contingency Buses	0													15			60
	All 991 active buses within useful lifespan												75 contingency buses beyond useful lifespan				

Note: Bus overhauls assumed to reduce effective average age by 4 years

Source: MBTA (2015)

BUS FLEET

SPARE RATIO

Federal regulations limit transit agencies to a 20% spare ratio (the proportion of the active bus fleet that can be held in reserve) in order for vehicle procurements to be eligible for federal funding.

Spares provide agencies with the ability to respond to vehicle failures or other disruptions but the regulation does not consider whether an agency also has a rail system that might need to deploy buses to provide replacement service during rail disruptions.

Because the 20% spare ratio is often insufficient to run shuttles during rail disruptions, the MBTA must pull buses (and service) from scheduled service.* This results in missed trips and overcrowding on scheduled bus service.



**Vehicles are only one resource needed to run shuttle service during rail disruptions. Operator availability is another constraint to providing shuttle service during peak periods.*

BUS FLEET

CHALLENGES

The 60-foot dual mode diesel/electric trolley buses used in Silver Line Tunnel are no longer manufactured in the United States.

- Currently overhauling existing vehicles
- Parts difficult to obtain; vehicles out of service while awaiting parts
- Long-term solution requires new vehicle type
- Constrains expansion of Silver Line service, which is already crowded

Rear-powered 60' articulated buses perform poorly in snow.

- Buses must be pulled from other routes.
- Need center axle power solution which is not yet available.

The addition of CNG and all-electric buses creates new needs:

- Maintenance facility upgrades, fueling/charging stations, training, and specialized equipment

The MBTA's multiple types of buses produce maintenance, replacement, and lifecycle challenges.



STATIONS AND STOPS

BUS STOPS

Waiting for the bus is a major part of the transit experience.

MBTA stops often lack basic amenities.

- Nationally-recognized standards suggest that shelters should be provided at stops with more than 50 to 100 boardings per day.
- 92% of the MBTA's 8,500 bus stops do not have bus shelters, including more than 425 stops with over 100 daily boardings.
- Besides Silver Line stops, only two bus terminals have real-time bus countdown screens (10 by end of 2015).

Many stops are also not accessible.

MBTA does not own or control most bus stops, which can limit ability to make improvements.



BUS STATIONS

At some major bus transfer stations, bus operations are constrained:

- Insufficient total capacity
- Difficult bus circulation
- Bus, pedestrian, and bicycle conflicts
- These issues contribute to delays and uncomfortable boarding environments.
- Examples include Dudley, Haymarket, Kenmore, and Central Square.



BUS FARE COLLECTION

Nearly all bus fares are collected/verified as passengers board the bus, which slows service – this is a challenge that is largely unique to the bus mode.*

To provide equitable access to CharlieCard discounts, the MBTA allows passengers to add value on board buses. But because this process is more time consuming than payment by CharlieCard, CharlieTicket, or cash, it increases dwell times at bus stops and creates delays for customers.

Bus riders who do not take other modes have only limited access to adding value to CharlieCards off the bus:

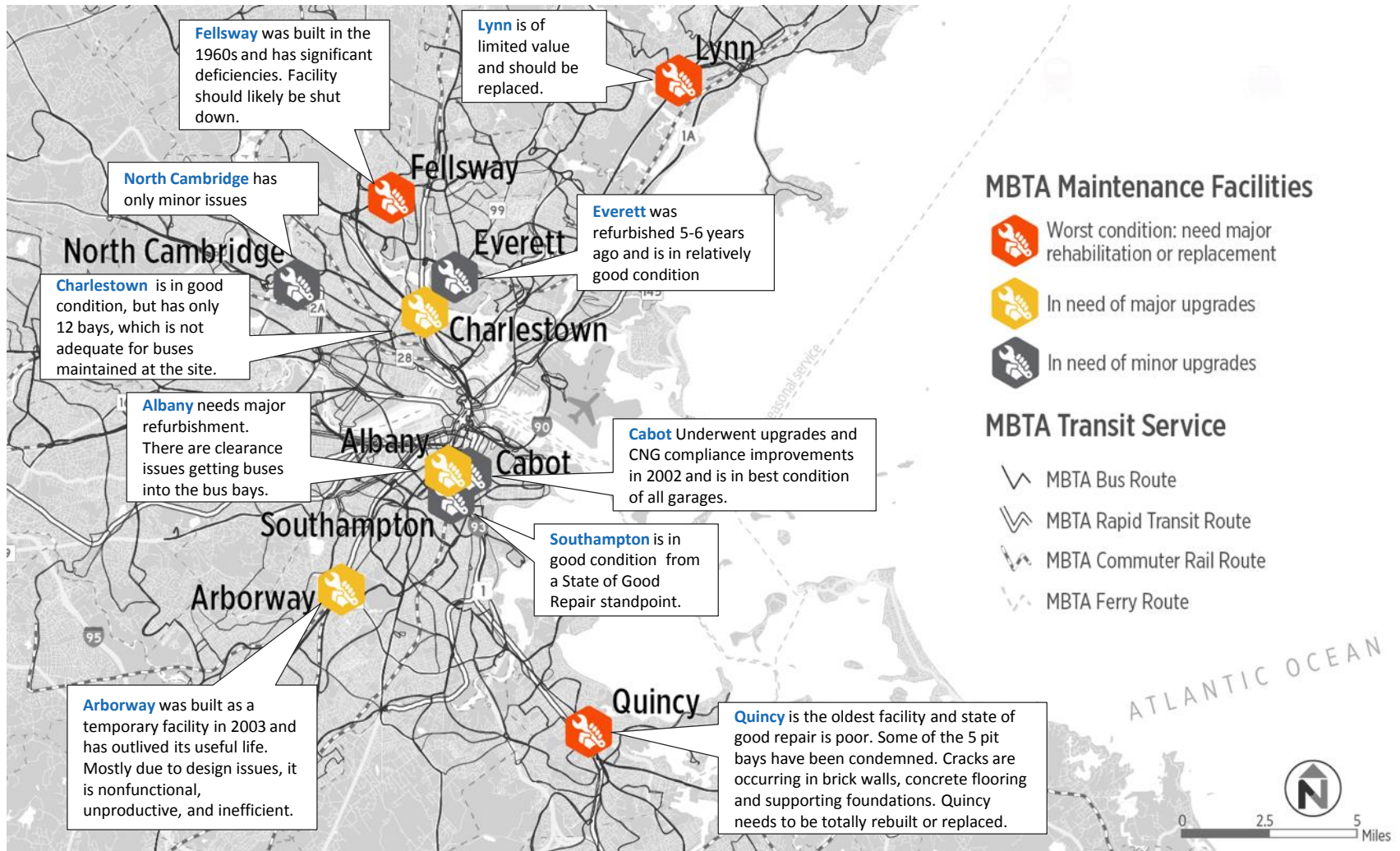
- Except for Dudley Station and the airport, Ticket Vending Machines are at rapid transit and commuter rail stations only.
- An alternative - retail sales terminals operated out of private businesses – are located mostly near rapid transit or commuter rail stations, and are less available along high-demand bus corridors and in low-income neighborhoods.

Note: Subway fares, rather than bus fares, are charged for Silver Line services.

**Also the case on the surface Green Line.*

BUS MAINTENANCE FACILITIES

SUMMARY OF CONDITIONS AND NEEDS



Source: MBTA 2014 Blue Book and "MBTA Maintenance Facility Analysis: Walk Around Document," December 2014, and MBTA document "Evaluation/Condition Assessment of MBTA Bus Maintenance Facilities," recent but undated.

BUS MAINTENANCE FACILITIES

The MBTA's bus facilities vary in size, age and condition; the types and numbers of buses that can be maintained within them; and maintenance capabilities.

Four of the MBTA's maintenance facilities are over 70 years old, with the oldest built in 1930.

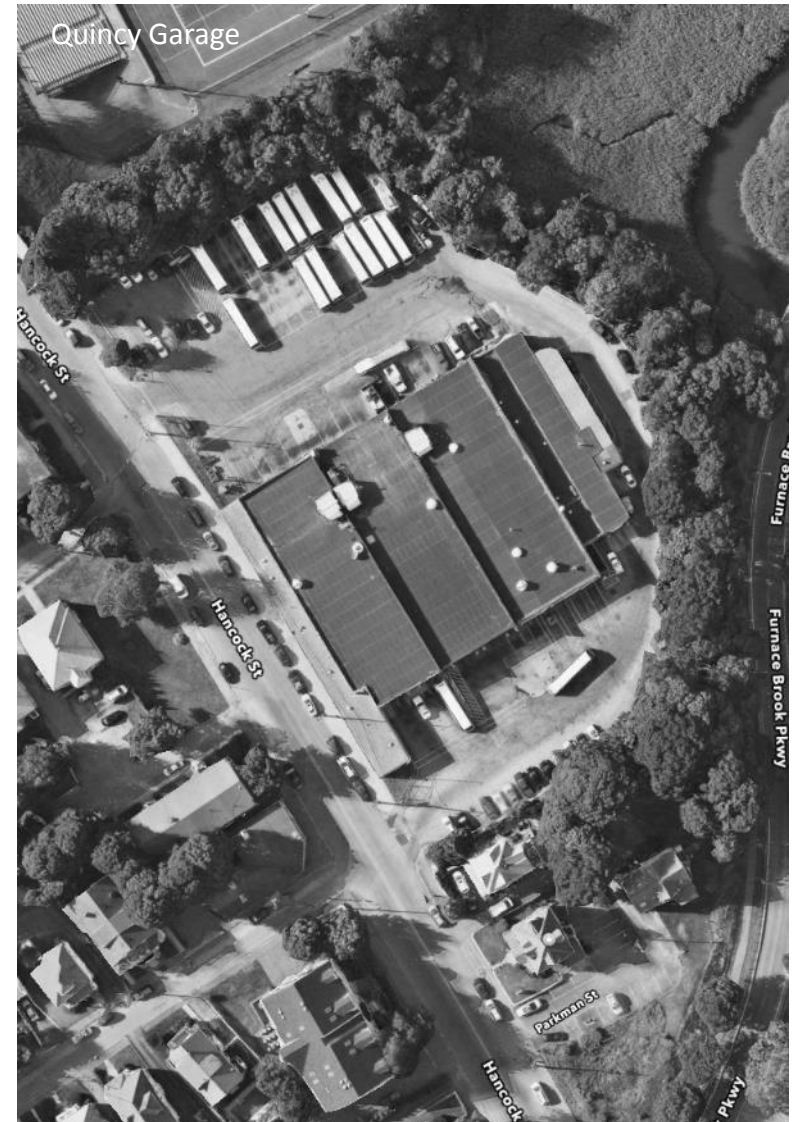
Facility	Year Built	Last Major Update	Number of Buses	Vehicle Types
Albany	1930	-	110	Diesel
Arborway	2003	-	119	CNG
Cabot	1974	2001	205	Diesel & CNG
Charlestown	1979	2001	233	Diesel
Fellsway	1960	-	80	Diesel
Lynn	1930	-	72	Diesel
North Cambridge	1980	-	28	Electric Trolley Bus
Quincy	1930	-	86	Diesel
Southampton	2006	-	78	Diesel, Diesel/Electric, & CNG

Source: Number of Buses and Vehicle Types: MBTA 2014 Blue Book (data from 2012)

BUS MAINTENANCE FACILITIES

MOST ARE NEAR, AT, OR ABOVE PRACTICAL STORAGE CAPACITY

- Most facilities are at storage capacity based on site sizes and current layouts.
- Service expansion to reduce crowding and meet new needs will require additional available land.
- Expansion will require either new facilities and/or reconstructing existing facilities in layers (for example, employee parking and administrative offices above or below bus maintenance areas).
- Lack of inside storage hinders severe weather operations.



BUS MAINTENANCE FACILITIES

MANY BUS MAINTENANCE FACILITIES ARE OUTMODED IN KEY WAYS

- Some doors not high enough for some buses
- Some ceilings not high enough to lift buses
- Insufficient space and/or equipment to perform proactive preventive maintenance
- Facilities need to adapt to new regulations, new fuel types, and new technologies

Facility	Number of Buses	Repair Bays	Buses/Repair Bay
Albany	110	6	18
Arborway	119	6	20
Cabot	205	14	15
Charlestown	218	12	18
Fellsway	65	6	11
Lynn	69	10	7
North Cambridge	28	5	6
Quincy	64	5	13
Southampton	113	10	11

- *Desirable size for a large transit systems: 150-250 buses per facility*
- *Typical industry practice: one repair bay for every 10 to 15 buses, **although most transit systems lack a central repair facility like Everett, which is a major benefit for the MBTA.***

Source: MBTA 2014 Blue Book (data from December 2013; active buses)

BUS MAINTENANCE FACILITIES

MOST IN NEED OF REPLACEMENT:

- **Fellsway**: Very poor condition. MBTA desires to replace with new Wellington facility.
- **Lynn**: Not suitable for maintenance of modern vehicles. Prior assessment recommended converting to storage and operations only and relocating maintenance to a potential new Wellington facility.
- **Quincy**: Built in 1930. In poor condition and not suitable for modern maintenance needs and practices. Needs to be rebuilt or replaced.



BUS MAINTENANCE FACILITIES

MOST IN NEED OF MAJOR UPGRADES:

- **Albany:** Poor layout and condition, over-capacity, and only six repair bays for 110 buses.
- **Arborway:** Temporary facility built in 2003. Some facilities in trailers, and only six repair bays for 119 buses.



INADEQUATE MAINTENANCE FACILITIES ARE A BARRIER TO PROVIDING MORE BUS SERVICE FOR RIDERS

Facility size and maintenance capacities prevent an increase in the size of the bus fleet. Without a place to store and repair more buses, they can't be put on the road.

Facility expansions and/or new facilities represent:

- Significant capital expenses
- Political challenges related to locating new or expanded maintenance facilities in Greater Boston's densely populated core



RIGHTS OF WAY: BUS TUNNELS

The **Harvard bus tunnel** is deteriorating (leaking roof, drainage issues, and poor roadway surface). Needs have not been fully assessed and repairs are not programmed.

The **Silver Line tunnel** has leakage and drainage issues, and poor roadway surface, which produces poor ride quality.

Tunnel deterioration will likely further impact service if not addressed.



RIGHTS OF WAY: BUS CATENARY SYSTEM

The **Silver Line** catenary system will require an upgrade to a more resilient and maintainable system.

The current system was untried at the time that the MBTA installed it, and it now needs to be upgraded. Other, less-complicated systems are now available and will be investigated.

The **North Cambridge** catenary is currently earmarked with funding to be modernized, and many of the core line components are to be replaced as well.

Some additional funding may be needed to change the signaling system in the North Cambridge yard and maintenance facility.



RIGHTS OF WAY: BUS DEDICATED LANES

The **Washington Street and Essex Street bus lanes** are often used by regular traffic and as truck loading zones due to poor enforcement, lack of barriers, and poor maintenance resulting in deterioration of pavement markings. This can significantly degrade their ability to provide better bus service for MBTA riders.

The MBTA requires partnerships with municipalities in order to expand the application and effectiveness of dedicated lanes.



RIGHTS-OF-WAY: BUS STOP ACCESSIBILITY

Barriers to access exist at many bus stops :

- Boarding areas that are too narrow or located on uneven stretches of sidewalk
- Inaccessible material within bus stop (grass, bricks, deteriorated concrete)
- Inaccessible paths of travel
- Undersized stops that are too small for a bus to pull parallel to the curb for safe, efficient boarding

Because the MBTA does not own most of its bus stops or the right of way for buses, **improvements must be negotiated through municipalities.**

Environmental barriers can be difficult to eliminate:

- Lack of snow removal prevents customers from accessing stops.
- Illegally parked vehicles hinder boarding and alighting.
- Street furniture such as trash cans and bike racks obstruct boarding areas.



ACCESSIBILITY: OTHER

Continuous capital investment and modernization are necessary to ensure high-quality service for all users. Examples of additional deficiencies include:

- Ramps on some low-floor buses are problematic and can require operator manual intervention.
- Unreliable external destination announcements.
- Lack of consistent, bold priority seating signs.
- Securement areas for wheeled mobility users that are often obstructed by strollers/luggage.
- Customers who are blind or have low vision report difficulty identifying bus stops.



SUMMARY

SUMMARY: SERVICE

The MBTA offers a range of bus services that carry 446,700 passengers per weekday constituting over one third of MBTA ridership.

However, a number of issues preclude higher ridership and high ridership satisfaction:

- Buses are often overcrowded during peak times.
- Less than two-thirds of bus trips operate on-time.
- There are limited amenities for customers even at high ridership locations.



SUMMARY: MAINTENANCE FACILITIES

The storage and maintenance capacity of existing MBTA maintenance facilities is a significant obstacle to improving service:

- Inability to add additional buses to meet frequency and capacity standards or to add new service.
- Insufficient space to replace 40' buses with 60' buses to reduce passenger crowding.
- Limited ability to proactively maintain vehicles as repair bays are at capacity with urgent maintenance needs.



SUMMARY: BUS FLEET

The condition and management of the bus fleet has a major impact on service.

- The bus fleet is aging, leading to frequent breakdowns and buses needing to be taken out of service, resulting in dropped trips.
- Although the fleet age will improve in the near term, procuring a large percentage of the fleet at one time is not an optimal asset management strategy because it produces large spikes and dips in maintenance needs.
- The high average age for the fleet is likely to continue to be an issue over the next 25 years.



SUMMARY: OTHER BUS CONCERNS

Other issues also require significant attention in order to improve service:

- Due in part to a lack of MBTA ownership of streets and sidewalks, **customer comfort** and **accessibility needs** are often compromised and need now to be prioritized through MBTA/municipal collaboration.
- Existing **dedicated lanes** require more enforcement to be effective.
- Maintaining **tunnels** and **catenary systems** has been a lower priority and these assets are in disrepair.

